Does Government Expenditure in Education Cause Economic Growth: ASEAN-5 Perspective

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Abstract—**Debates on linkages between education expenditure and economic growth have gained attention from economists, especially based on Wagner Law. Education expenditure is listed as a government public expenditure with the highest accumulation in yearly budget for ASEAN-5, which includes Malaysia, Indonesia, the Philippines, Singapore and Thailand. This empirical study aimed to examine the relation between education expenditure and economic growth in ASEAN-5 over the 2000-2018 periods. To achieve the objective, it was more appropriate to examine the estimation model was. With regard to the fixed effects model, there was no relation between education expenditure and economic growth. Furthermore, the analysis has proved that labour force and capital accumulation were important variables which influence economic growth.**

Keywords—human capital; economic growth; labour; ARDL;

I. INTRODUCTION

SOUTHEAST Asean region is experiencing rapid economic growth to enrich the living standard in peace and harmony. Some psychologists have suggested that happiness consists of three distinct elements: the pleasant life, the good life, and the meaningful life. Diener et al. (1999) education shows a positive (but weak) correlation with happiness, intelligence is not appreciably related to happiness. Wagner Law explains that the public expenditure will grow continuously as the output growth in developing countries. Manuel (2018) Wagner's Law is based on a secular relation, which means its empirical testing must be carried out within a long-term context, in which changes in political and economic conditions can occur. This is to ensure that our living standards and health fulfil the quality of life requirements, especially skilled labour and a productive society.

The Malaysian Government, for example, has focused on the education sector since the First Malaysia Plan (1966-1970) and allocates a higher budget from total yearly budget. From 1970, the education expenditure was 6% from total government budget, and the portion has increased until in 2018, which was 11.4%.

The five largest economic performances in ASEAN or ASEAN-5 (comprising Malaysia, Indonesia, Singapore, Thailand, and the Philippines) feel the impact of education expenditure as a social responsibility to ensure human life enrichment. Among ASEAN-5, growth is expected to remain solid. The annual growth of gross domestic product (GDP) showed an increase in trend since the 1997/1998 economic financial crisis (Figure 1). The trend was a positive growth and ASEAN-5 performances had similarity in performance, whereby the annual growth of GDP was estimated as more than 3% since 2011. ASEAN-5 has spent more accumulation on education expenditure as compared to other Southest Asean countries.

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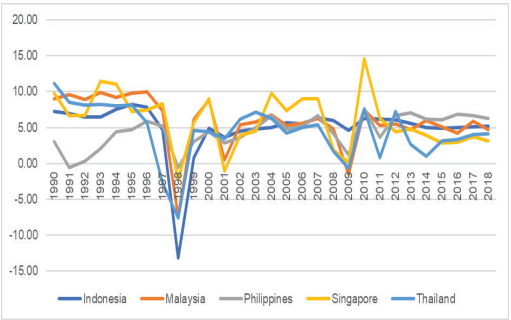

(Source: World Bank, 2019)
Fig. 1. Annual gross domestic product growth ASEAN-5

The purpose of this study is to investigate the causal relation between government expenditure in education and economic growth. The remaining part of this paper is organised as follows: Section 2 discusses the literature review related to research. Section 3 consists of data and methodology. Section 4 presents the empirical results and discussion on research is in last section.

II. LITERATURE REVIEW

Many research studies were conducted on the role of education expenditure and economic growth. However, empirical results from previous research found mixed interpretation, especially for countries with different environments and cultures. Despite the complexity of Wagner Law arguments, there were many attempts to test its validity for different countries and variables. Lai and Yussof (2014) tried to explore the relation between human capital and economic growth in Malaysia from 1981 to 2010. Empirical evidence revealed that there was a significant long run relation between education level and economic growth.

It was concluded and suggested to boost education expenditure in the future as it will help Malaysia in a mission to be a high-income country. A contrary research by Self and Grabowski (2004) analysed the impact of education on income growth in India. The research divided the education level by deep analysis for each category towards the economic growth. Enrollment ratios were a useful measure of education, though they do have some limitations. The results from analysis showed that primary education has a strong impact on economic growth. Given the existing literature to explain the relation between education or human capital and economic growth, its causality has mixed conclusion. For instance, Mendy and Widodo (2018) examined the difference between education levels and the Indonesian economic growth. The study revealed a long run relation between education level and economic growth by using ARDL method; hence, the study suggested improvement in infrastructure, establishment of well-equipped classroom rather than focusing on increase in the number of enrollment at primary level.

Kasri (2011) who utilised the error correction model concluded that secondary school education gave a higher contribution to economic growth and not primary school education. Yahya et al. (2012) revealed the existence of a long run relation between education expenditure and economic growth. Vector auto regression (VAR) was used to test the time series data from 1970 to 2010 with variable capital fixed formation, labour force and government expenditure in education. The results were positively significant and caused Granger causality in government expenditure in education and economic growth. Mallick, Kumar, and Pradhan (2016) who analysed by using FMOLS showed that the education expenditure only caused Granger causality to the economic growth for all countries in the long run. The analysis was for 14 Asian countries and it concluded that investment in the education sector of respective countries was an essential determinant for long-term economic growth.

Nurudeen et al. [18] concluded that expenditure in education might be necessary but not a sufficient condition for economic growth. The study found a long-run negative association between government expenditure in education and GDP but failed to realise any short-run causality between the two variables. Sheehan (1971) mentioned that investment in education was merely consumption and due to the fact that investment in acquiring knowledge or skills was for the individual interests only

and did not contribute to economic growth. In the meantime, analysis of 43 developing countries by Devarajan et al. (1996) showed that excessive government expenditure in education was negatively correlated with the country's economic growth. By using time series analysis based on 52 countries between 1960 and 1990, Blis and Klenow (2000) supported that it was too weak to conclude the relation between education and economic growth.

III. DATA AND METHODOLOGY

The main aim of this study was to analyse the relation between government expenditure in education for ASEAN-5 (Malaysia, Indonesia, Philippines, Thailand and Singapore) over the 2000-2018 span. Let n be the total number of countries and m the number of observations panel data series (year, in this case). The study model was based on Cobb-Douglas function.

$$Yt(n)= \alpha \, Km, Zm, Lm \quad (1)$$

Where, Yt is gross domestic product (GDP), Kt is education expenditure, Zm is capital accumulation, and Lm is labour force ASEAN-5. Taking the natural logarithm to both sides of Equation (1):

$$In\ Yt=⟦\beta\_0+\beta⟧\_1\ in\ K\_m+\beta\_2\ in\ Z\_m\ ⟦+\beta⟧\_3\ in\ L\_m+\mu\_t \quad (2)$$

When the gross domestic products (GDPs) for countries are different from their growth standard deviations, it is used as volatility and 0 was given and there after 1 as dummies. The regression between the variables is shown in Equation (3) where, X is the dummy. The error term in the equation is α and i shows the cross section and t time periods.

$$Yit=\beta0 + \beta1Xit + \alpha it \quad (3)$$

In the cross section data, autocorrelation problem will stop because lag value was added to the right part of the model. Volatility of lag added in the model is as shown in Equation (4).

$$Yit = \beta0 + \beta1Xit + Yit(-1)\ \mu it \quad (4)$$

Error term is shown as: $\mu it = \alpha it + \eta it$. It is assumed that μit is uncorrelated with explanatory variable and αit is individual effect and it may or may not be correlated with explanatory variable. In a study by Johnston and Dinardo (1996), αit was correlated with explanatory variable for fixed effects and uncorrelated with explanatory variable for random effects model. Greene (2003) stated that if αit is a constant term the model will be a pooled regression. To identify which model was appropriate for random effects and fixed effects, it was translated into:

H0 : Cov (Λi, xit)=0 (No correlation between Λi and xit) support random effects,
H1 : Cov (Λi, xit)=0 (correlation between Λi and xit) support fixed effects

Hausman specification test was used to identify which model was appropriate for the analysis. A large value against (p-value < 0.05) indicates that fixed effects should be used.

TABLE I. DESCRIPTIVE STATISTICS

	LGDP	LGE	LGF	LGC
Mean	11.39	1.79	5.53	10.78
Median	11.42	1.31	5.02	10.78
Maximum	12.02	4.09	7.64	11.56
Minimum	10.88	0	3.97	10.17
Std. Dev.	0.29	1.25	1.29	0.33
Skewness	0.27	0.41	0.47	0.48
Kurtosis	2.62	2.22	1.70	2.85
Observations	95	95	95	95

The next analysis was Chow test to examine the intercept restrictions, whether they were the same or different. Fixed effects model assumes that each country has different intercept but pooled OLS ignores the panel nature of data and treat the error term as identically and independently distributed (Siong, 2018). To test this model, new dummies were first created and developed before analysing the model. Table 1 reports the summary of statistical analysis of ASEAN-5 indicator, whereby the sample period

was covered in 2000-2018. Table 1 reported on a summary of the statistical data analysis, which was 95 observations within five countries.

IV. EMPIRICAL RESULT

Table 2 shows the results of analysis for Pooled OLS, fixed effects and random effects models. In summary, Breusch-Pagan LM test was to identify a more appropriate model between pooled OLS and random effects model. The analysis rejected H0 at p-value < 0.05 and concluded that the random effects model was more appropriate than pooled OLS.

TABLE II. PANEL DATA ANALYSIS (DEPENDENT VARIABLE: LG)

	Pooled OLS	Random Effect	Fixed Effects
Constant	2.12 (0.00)*	2.17 (0.00)*	0.22 (0.72)
lg education	0.01 (0.19)	-0.02 (0.09)	-0.02 (0.11)
lg labour force	0.01 (0.15)	0.01 (0.61)	0.58 (0.00)*
lg capital	0.86 (0.00)*	0.86 (0.00)	0.75 (0.00)*
Breusch-Pagan LM	12.19 (0.00)		-
Hausman Test	-	13.77 (0.00)	
Observations	95	95	95

*indicates the respective 1% significance level.

The next steps were to test the random effects and fixed effects to identify which estimator model was more appropriate based on Hausman test. If the Hausman test is bigger and the p-value is less than 0.05, the null hypothesis is rejected. The random effects model was against the economic theory because p-value was<0.05 from the Hausman test and the null hypothesis was rejected. There were country specific effects in the data analysis.

Table 2 indicates that the fixed effects of each country which have different intercepts are accepted and this model is more appropriate. Imai and Kim (2019) stated that many researchers use these models to adjust for unobserved, unit-specific, and time-invariant confounders in estimating the causal effects from observational data. Siong (2018) used fixed effects within the variation in data only but was the most flexible because it allowed the endogeneity of regressors. Next analysis was the lease square dummy variable (LSDV) to obtain the fixed effects estimator from the model. This estimation explained the intercepts of each cross-section unit and provided information for the present study objective. Table 3 shows the LSDV estimator.

TABLE III. LSDV ESTIMATOR

	Coefficient	Std. Error	t-Statistic	Probability
C(1)	-0.36	0.78	-0.46	0.65
C(2)	-0.07	0.01	-1.59	0.11
C(3)	0.74	0.04	19.66	0.00*
C(4)	0.58	0.17	3.33	0.00*
C(5)	1.45	0.41	3.58	0.00*
C(6)	1.135	0.33	3.46	0.00*
C(7)	0.89	0.26	3.41	0.00*
C(8)	-0.57	0.21	-2.79	0.00*
R-squared				0.978
Adjusted R-squared				0.976
S.E. of regression	0.043	Akaike info criterion		-3.339916
Sum squared resid	0.167	Schwarz criterion		-3.124853
Log likelihood	166.646	Hannan-Quinn criter.		-3.253015
F-statistic	555.905	Durbin-Watson stat		0.714634
Prob(F-statistic)		0.00		
The model: (LGDP=C(1)+C(2)*LGE+C(3)*LGC+C(4)*LGF +C(5)*D2+C(6)*D3+C(7) *significance level at 1%.				

Before LSDV analysis was explained, Wald test was estimated to check whether all dummy variables were one of the ways. From the results, fixed effects model was appropriate model because p-value < 0.05.

From the LDDV analysis for fixed effects model, the table presents that estimated education expenditure was not significant for ASEAN-5 countries and could not explain the dependent variable. Capital accumulation and labour force was significant with positive

relation with the dependent variable. From the analysis, there was an increase of 1% in GDP, the capital accumulation increased by 7.4% and labour force by 5.8%.

If analysis was re-looked for the best method, only random effects model value of education expenditure was significant and other pooled OLS and fixed effects were not significant. From the analysis based on theory, fixed effects model was appropriate. Tom and Drew (2015) mentioned that under certain conditions, random effects model could introduce bias but will reduce the variance of estimates of interest coefficients. Fixed-effects estimates will be unbiased but may be subjected to high sample dependence.

TABLE IV. WALD TEST

Test Statistic	Value	df	Probability
F-statistic	10.24719	(4, 87)	0.00
Chi-square	40.98877	4	0.00

V. CONCLUSION

The purpose of this study was to test the relation between education with economic growth, as government expenditure in the education sector and economic growth development. This study found that there was no relation between education and economic growth. The analysis concluded that expenditure portion in education is not related to economic growth, but it is a part of social development of the society for living in happiness and enriching skills. Blis and Klenow (2000) argued that it was too weak to conclude that education or school achievement significance has contributed to the economic growth. Previous studies on economy and education have gained the benefits of global knowledge-based economy. Currently situation, human capital is a relevant tool to decrease the cost of living, promote better salaries and enrich the standard of living in harmony. in case of Nigeria, Mitchell (2005), stated that factors, such as total factor of productivity, the factor of accumulation, good education and healthcare helped the poor to lead a more productive life, increase in return on investment, as well as create sustainability in the economic growth of a given country. A more productive labour force also helped to stimulate private sector development.

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